Blog #5-Radiclas and the Sign of the Radicand

We talked about the sign of the radicand briefly in class, but the following will give you a more in depth understanding. Read the following cases of signs under the radicand and discuss the following questions in your blog.

1. **From the following information, what do you think the sign of the question $\sqrt[3]{-27}$ would be? Explain your reasoning.**
2. **From the following information, what do you think the answer of $\sqrt[4]{256}$ would be? Explain your reasoning.**

Radicals and then Sign of the Radicand

There are four different cases that encompass the world of radicals.

Case 1: Positive Radicand and Even Root

$$\sqrt[even]{positive}$$

In Case 1, it is common mathematical convention that there is only one solution and this solution is positive. For example, the square root of 4 is only positive 2, even though (technically speaking) -2 is a root since (-2)(-2)=+4. Consequently, when asked, "what is the square root of 25?" the correct answer is "only positive 5." Similarly, if asked, "what is the 4th root of 16?" the correct answer is "only positive 2" even though $(-2)^4 = 16$ too.

Case 2: Positive Radicand and Odd Root

$$\sqrt[odd]{positive}$$

In Case 2, there is only one possible answer. By comparison and for clarification's sake, in Case 1, there were two possible answers, although mathematical convention agreed that only one of those answers (i.e., the positive one) was correct. Due to the nature of how

negative numbers behave when multiplied together an odd number of times (i.e., they retain their negative sign), it is impossible to have a negative answer in Case 2.

Case 3: Negative Radicand and Odd Root

$$\sqrt[odd]{negative}$$

In Case 3, there is only one possible answer. Since the only way to have a negative product is by multiplying a negative number an odd number of times, the answer in Case 3 is always negative. In order to more clearly see this, notice that multiplying together a negative number an even number of times produces a positive number. Similarly, multiplying a positive number by itself an odd number of times produces a positive number.

Case 4: Negative Radicand and Even Root

$$\sqrt[even]{negative}$$

In Case 4, there is no answer to this type of question within the domain of what are called real numbers. Technically, this Case can be answered using what are known as imaginary numbers--but this is well beyond the scope of what we are looking at. If you encounter a question such as "what is the square root of -4" the correct answer is "there is no real solution."